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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
FETZNER, TIFFANY A	

ART UNIT	PAPER NUMBER
2859	

DATE MAILED: 08/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

5A

Office Action Summary	Application No.	Applicant(s)	
	10/604,748	MANTONE ET AL.	
	Examiner	Art Unit	
	Tiffany A. Fetzner	2859	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 May 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 November 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☒ Interview Summary (PTO-413) Paper No(s)/Mail Date. *08/06/2005*.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED 3rd Non-final ACTION

Oath/Declaration

1. The oath or declaration filed 5/31/2005 overcomes the objection of the January 31st 2005 Office action.

Drawings

2. As noted in the January 31st 2005 Office action, the Official draftsperson however has objected to the drawings filed November 16th 2004 for formal matters. See the PTO 948 form attached to the last Office action of January 31st 2005.. Formal drawings which resolve the Official draftsperson's objections are now required.

3. The examiner has approved the amended drawing corrections submitted in November 16th 2004 response. Formal drawings which include the examiner approved corrections, and resolve the Official draftsperson's objections are now required.

Specification

4. The objections to the abstract from the August 23rd 2004 office action are **rescinded** in view of the new abstract submitted November 16th 2004 response.

5. The disclosure is objected to because of the following informalities:

A) Original specification paragraph [0010] has a grammatical problem, the examiner suggests **after** the words "temperature sensors" **delete** "are".

B) Original specification paragraphs [0019], is contradictory and the confusion is maintained by original specification paragraphs [0024] and [0025] where component **232** is first defined as "a hollow area" in paragraph [0019] and then in the immediately following sentence of paragraph [0019] is defined as a "coolant tube". Paragraphs [0020] and [0024] refer to component 232 as a "coolant tube"] **Correction as to whether component 232 is "a hollow area", or a "coolant tube" is needed because** it directly impacts which prior arts are applicable to the merits of the application. Specifically: the **Kaindl et al.**, references are applicable to coolant flowing directly inside hollow gradient coil windings in direct contact with the windings without a separate barrier, such as plastic or a coolant pipe between the windings and the coolant;, the **Arz et al.,** references GB 2342986 and US 6741152 B1 show coolant directly flowing through gradient coil windings protected by a plastic tubular coating

which lines the hollow channel defined by the windings of the gradient coils themselves; while the **Heid** references 6,774,631 B2 and 2001/0033168 A1 show coolant directly flowing through gradient coil windings, within a separate cooling pipe. The coolant inside the cooling pipe, cools the cooling pipe, and the cooling pipe, which is within the hollow area defined by the gradient coil windings directly cools the gradient coil windings.

C) A coolant flowing inside the *d*irectly cooled hollow gradient coil windings, where a protective coating on the windings, such as a plastic tubular shaped coating 3, on the hollow inner cooling channel 4, of the gradient coil conductor sgments 1, which have a symmectric hollowed profiles 2, in order to support the plastic tubular shaped coating of the hollow inner cooling channel 4, in which water component 6, flows through the gradient coil windings within the plastic coated tubular hollow space 3, of the hollow channel 4, of the Arz. et al., US patent 6,741,152 B1, meets applicant's claim 1. [See **Arz et al.,** abstract, figures 1, 2, col. 3 lines 30-62; col. 1 lines 55 through col. 2 line 38.

D) The **Kaindl et al**., references also teach directly cooling magnetic resonance gradient coil devices by means of "cooling lines that are embedded in the coil and through which a cooling agent flows, [See respectively the corresponding abstracts, figure 5, the first three lines of paragraph [0005] in the kaindl et al., PreGrantPublication and col. 1 lines 30-33 in the corresponding US patent where Kaindl et al., teaches the "possibility of providing cooling by providing hollow electrical lines as the coil windings, through which a cooling agent flows, in combination with col. 1 lines 49-56; or paragraphs [0006], [0007] which teach that the windings in question are gradient coils.

E) The **Heid references** also show an shielded MRI transverse gradient coil arrangement where a hollow cylindrical conductor has a cooling medium flowing therethrough as per page 1 paragraph [0012] page 2 paragraphs [0021], [0022], [0023]; and figure 2; or correspondingly col. 2 lines 20-23; col. 3 lines 21-43 in combination with figure 2. Figure 2 shows that the gradient coil conductor 12 is hollow and that inside the hollow windings is a cooling pipe 11a, through which a cooling medium such as water is flowingly guided for purposes of cooling hollowgradient coil conductor 12. Appropriate correction is required.

Response to Arguments

6. Applicant's arguments with respect to **claims 1-25** from the May 31st 2005 response have been considered but are moot in view of the new ground(s) of rejection.

7. Additionally, the examiner notes that the **Damadian et al.,** reference US 6,369,571 B1 which was applied with the last office action, but **was misidentified by applicant on page 8 of the May 31st 2005 response** with the wrong US patent number, (i.e. applicant referred to **Damadian et al.**, but cited **Boemmel et al.,** US patent 6,111,412) was also discussed. The examiner notes that the **Damadian et al.,** reference conderns static main magnetic MRi coils, not the gradient coils recited by applicant in the pending claims, but does have a coolant directly flowing through the static main magnetic coil windings, in direct contact with the metal windings.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. **Claims 1, 2, 15,** and **20-25** are rejected under **35 U.S.C. 102(b)** as being anticipated by **Arz et al.,** GB patent 2 342 986 A published 26 April 2000; which corresponds to ***Arz et al.,** US patent 6,741,152 B1 issued May 25th 2004, filed September 2nd 1999.

10. With respect to **Claim 1**, **Arz et al., GB** patent **2342986A** teaches and shows "A transverse gradient coil" assembly where the "x" and "Y" directions of the gradient coil conductor winding assembly shown in figure 1 are 'transverse' (i.e. arranged at 90 degrees / perpendicular / orthogonal) to the direction of the main magnetic field which makes use of the **Arz et al.,** gradient coil assembly. [See figures 1-9.] **Arz et al.,** also teaches and shows that the gradient coil assembly also comprises "a strip of electrically conductive material; [See conductor 1 of figures 1, 2, 3, and 5; the abstract, page 1 line 2 through page 8 line 10; especially page 6 line 4 through page 7 line 2.] "and said strip of electrically conductive material having a hollow portion such that fluid is permitted to

flow through the conductive material." [See page 6 line 4 through page 7 line 2.] The examiner notes that conductive tubes, pipes and conduits are necessarily and intrinsically hollow.

11. With respect to **Claim 2**, **Arz et al.,** teaches and shows from figure 9; col. 5 line 36 through col. 6 line 3; and col. 3 lie 36 through col. 4 line 4 that " the hollow conductor is wound in a helix" (i.e. a spiral) "to form the general shape of a cylinder." The same reasons for rejection, that apply to **claim 1** also apply to **claim 2** and need not be reiterated.

12. With respect to **Claim 15**, **Arz et al.,** teaches and shows "A gradient coil assembly comprising: a strip of conductive material;" [See conductor 1 of figures 1, 2, 3, and 5; the abstract, page 1 line 2 through page 8 line 10; especially page 6 line 4 through page 7 line 2.] "said strip of conductive material being formed into a cylindrical coil winding;" [See page 6 line 4 through page 7 line 2.] "said winding including a continuous tubular hollow area through the winding, said hollow area permitting the continuous flow of coolant." [See conductor 1 of figures 1, 2, 3, and 5; the abstract, page 1 line 2 through page 8 line 10; especially page 6 line 4 through page 7 line 2] The examiner notes that tubes, pipes and conduits are necessarily and intrinsically hollow and subsequently automatically permit an internal coolant to flow.

13. With respect to **Claim 20**, **Arz et al., GB** patent **2342986A** teaches and shows "A transverse gradient coil" assembly where the "x" and "Y" directions of the gradient coil conductor winding assembly shown in figure 1 are 'transverse' (i.e. arranged at 90 degrees / perpendicular / orthogonal) to the direction of the main magnetic field which makes use of the **Arz et al.,** gradient coil assembly. [See figures 1-9.] "comprising: a cylindrical inner coil winding" [See figures 1 through 9 hollow conduit channel 4; lined by the tubular plastic pipe-like material 3; the abstract, page 1 line 2 through page 8 line 10; especially page 6 line 4 through page 7 line 2], "said winding further including a continuous tubular hollow area through the winding", See the abstract, page 1 line 2 through page 8 line 10; especially page 6 line 4 through page 7 line 2; and figures 1 through 9] "said tubular area permitting the continuous flow of coolant;" [See conductor 1 of figures 1, 2, 3, and 5; the abstract, page 1 line 2 through page 8 line 10; especially

page 6 line 4 through page 7 line 2, where water is taught to be used as a coolant] "a filler material surrounding" the inside of "the coil winding;" (i.e. the plastic material that lines the inner hollow channel 4, of figure 2, [See the abstract, page 1 line 2 through page 8 line 10; especially page 6 line 4 through page 7 line 2] "and a plurality of coolant pipes situated in thermal contact with the gradient coil in the filler material." [See figures 3, 4, 7, 8, 9; page 1 line 2 through page 8 line 10; especially page 6 line 4 through page 7 line 2 where the cooling conduit(s) / pipe(s) / tube(s) is/are in good thermal contact with the conductive windings of the gradient coil assembly.]

14. With respect to **Claim 21**, **Arz et al.,** teaches and shows "a plurality of hollow conductor sections, each permitting fluid to flow through the hollow conductor." [See Figures 1-9; component 2, page 1 line 2 through page 8 line 10; especially page 6 line 4 through page 7 line 2] The same reasons for rejection, that apply to **claim 18** also apply to **claim 21** and need not be reiterated.

15. With respect to **Claim 22**, **Arz et al.,** teaches and shows "A method for cooling a gradient coil assembly comprising the steps of: providing a conductor having a continuous hollow center; winding the conductor into a spiral such that said conductor forms a cylinder; providing a cooling system for circulating a coolant through the hollow area in the inner gradient coil." [See the abstract, Figures 1-9; component 2, page 1 line 2 through page 8 line 10; especially page 6 line 4 through page 7 line 2] The same reasons for rejection, that apply to **claims 1, 15, 20, 22** also apply to **claim 23** and need not be reiterated.

16. With respect to **Claim 23**, **Arz et al.,** shows "locating the wound cylindrical conductor in coaxial relationship with other cylindrical windings." [See Figures 3, 4, 7, 8, 9.] The same reasons for rejection, that apply to **claim 22** also apply to **claim 23** and need not be reiterated.

17. With respect to **Claim 24**, **Arz et al.,** shows positioning the "windings in a radially spaced-apart coaxial relationship." [See Figures 3, 4, 7, 8, 9.] The same reasons for rejection, which apply to **claims 22, 23** also apply to **claim 24** and need not be reiterated.

18. With respect to **Claim 25**, **Arz et al.,** teaches " the step of circulating coolant through said coil windings." [See the abstract, Figures 1-9; component 2, page 1 line 2 through page 8 line 10; especially page 6 line 4 through page 7 line 2] The same reasons for rejection, that apply to **claims 22, 23**, **24** also apply to **claim 25** and need not be reiterated.

19. **Claims 1** and **15-25** are rejected under **35 U.S.C. 102(b)** as being anticipated by **Heid** US patent application publication **2001/0033168 A1** published October 15th 2001, filed April 23rd 2001.

20. With respect to **Claim 1**, **Heid 2001/0033168 A1** shows "A transverse gradient coil assembly" because **Heid 2001/0033168 A1;** shows from the cross section of figure 3 that "the gradient coil assembly of **Heid 2001/0033168 A1;** includes gradient coils which are both transverse, and parallel to the direction of the main static magnetic field. [See figure 3] **Heid 2001/0033168 A1** also teaches and shows that the gradient coil assembly also comprises "a strip of electrically conductive material; [See the copper or aluminum strip or tubing of the windings of page 2 paragraphs [0021] through [0023]]. "and said strip of electrically conductive material having a hollow portion such that fluid is permitted to flow through the conductive material." [See page 2 paragraphs [0021] through [0023] figures 1-3].

21. With respect to **Claim 15**, **Heid 2001/0033168 A1** teaches and shows "A gradient coil assembly comprising: a strip of conductive material;" [See the copper or aluminum strip or tubing of the gradient windings in figures 2, 3, and page 2 paragraphs [0021] through [0023], where "said strip of conductive material being formed into a cylindrical coil winding;" [See figures 2, 3, and page 2 paragraphs [0021] through [0023]], "said winding including a continuous tubular hollow area through the winding, said hollow area permitting the continuous flow of coolant." [See figures 2, 3, and page 2 paragraphs [0021] through [0023],

22. With respect to **Claim 16**, **Heid 2001/0033168 A1** teaches "the hollow conductor is wound for use in a shielded coil" [See page 2 paragraph [0017] and paragraphs [0024] through [0027]. The same reasons for rejection, that apply to **claim 15** also apply to **claim 16** and need not be reiterated.

23. With respect to **Claim 17 Heid 2001/0033168 A1** teaches and shows "the gradient coil is comprised of a plurality of hollow conductor sections, each permitting fluid to flow through the conductor." [See figures 2, 3, and page 2 paragraphs [0021] through [0023]], The same reasons for rejection, which apply to **claims 15 ,16** also apply to **claim 17** and need not be reiterated.

24. With respect to **Claim 18 Heid 2001/0033168 A1** teaches and suggests that additional cooling is provided by a plurality of coolant pipes situated in thermal contact around the coil" windings. [See figures 2, 3, and page 2 paragraphs [0021] through [0027] where figures 2 and 3 which show inner and outer cooling pipe-conduits 11a, 11b, and especially page 2 paragraph [0025].], The same reasons for rejection, that apply to **claims 15,16, 17** also apply to **claim 18** and need not be reiterated.

25. With respect to **Claim 19, Heid 2001/0033168 A1** teaches "the coolant passed through the tubular area is water, ethylene glycol or a mixture of the two coolants." [See page 2 paragraph [0023. The examiner notes that the teaching of using water or a 'coolant medium' directly meets all the recited features of this claim because a "coolant medium" comprises within its scope the use of "water, ethylene glycol or a mixture of the two coolants" as the coolant.] The same reasons for rejection, that apply to **claims 15, 16, 17, 18** also apply to **claim 19** and need not be reiterated.

26. With respect to **Claim 20**, **Heid 2001/0033168 A1** shows "A transverse gradient coil assembly" because **Heid 2001/0033168 A1;** shows from the cross section of figure 3 that "the gradient coil assembly of **Heid 2001/0033168 A1;** includes gradient coils which are both transverse, and parallel to the direction of the main static magnetic field. [See figure 3] **Heid 2001/0033168 A1** also teaches and shows that the gradient coil assembly also comprises "a cylindrical inner coil winding" [See figures 2 and 3]. "said winding further including a continuous tubular hollow area through the winding, said tubular area permitting the continuous flow of coolant;" [See figures 2, 3, and page 2 paragraphs [0021] through [0023], Additionally, **Heid 2001/0033168 A1** teaches "a filler material" (i.e. cooling pipe 11a, surrounding the inside, or heat insulator 13a surrounding the outside of conductor 12) which are each shown "surrounding the coil winding;" in figure 2 [See figures 2, 3, and page 2 paragraphs [0021] through [0027]]

"and a plurality of coolant pipes situated in thermal contact with the gradient coil in the filler material." [See figures 2, 3, in combination and the teachings of page 2 paragraphs [0021] through [0027] where the cooling pipe(s) / tube(s) is/are in good thermal contact with the gradient coil assembly.]

27. With respect to **Claim 21**, **Heid 2001/0033168 A1** shows "a plurality of hollow conductor sections, each permitting fluid to flow through the hollow conductor." [See figures 2 and 3] The same reasons for rejection, that apply to **claim 18** also apply to **claim 21** and need not be reiterated.

28. With respect to **Claim 22**, **Heid 2001/0033168 A1** teaches and shows "A method for cooling a gradient coil assembly comprising the steps of: providing a conductor having a continuous hollow center; winding the conductor into a spiral such that said conductor forms a cylinder; providing a cooling system for circulating a coolant through the hollow area in the inner gradient coil." [See figures 2, 3, in combination and the teachings of page 1 paragraph [0009] through page 2 paragraph [0027].

29. With respect to **Claim 23**, **Heid 2001/0033168 A1** shows "locating the wound cylindrical conductor in coaxial relationship with other cylindrical windings." [See figures 2 and 3] The same reasons for rejection, that apply to **claim 22** also apply to **claim 23** and need not be reiterated.

30. With respect to **Claim 24**, **Heid 2001/0033168 A1** shows positioning the "windings in a radially spaced-apart coaxial relationship." [See figures 2 and 3] The same reasons for rejection, which apply to claims 22, **23** also apply to **claim 24** and need not be reiterated.

31. With respect to **Claim 25**, **Heid 2001/0033168 A1** teaches " the step of circulating coolant through said coil windings." [See page 2 paragraph [0023]. The same reasons for rejection, that apply to **claims 22, 23**, **24** also apply to **claim 25** and need not be reiterated.

32. **Claims 1,** and **2** are rejected under **35 U.S.C. 102(b)** as being anticipated by **Kaindl et al.,** US patent application publication **2001/0042385 A1** published November 22nd 2001, filed April 12th 2001; which corresponds to **Kaindl et al.,** US patent 6,552,545 B2 issued April 22nd 2003 filed April 12th 2001.

33. With respect to **Claim 1**, **Kaindl et al., 2001/0042385 A1** shows "A transverse gradient coil" assembly. [See figures 1-6 where the flat gradient coils of figures 1, 3, and 4 when wound as in figures 5 or 6 are 'transverse' (i.e. arranged at 90 degrees / perpendicular / orthogonal) to the direction of the main magnetic field which makes use of the **Kaindl et al.,** gradient coil assembly. [See figures 1-6.] **Kaindl et al.,** also teaches and shows that the gradient coil assembly also comprises, in the first three lines of the abstract, and the first three lines of paragraph [0005]] "a strip of electrically conductive material; [See conductor 1 of figures 1, 2, 3, 4, and 6] "and said strip of electrically conductive material having a hollow portion such that fluid is permitted to flow through the conductive material." [See the first three lines of the **Kaindl et al.,** abstract, and the first three lines of **Kaindl et al.,** paragraph [0005]. The examiner notes that conductive tubes, pipes and conduits are necessarily and intrinsically hollow.

34. With respect to **Claim 2**, **Kaindl et al., 2001/0042385 A1** teaches and shows from paragraph [0005] "structures wound in spiral fashion" which suggests that "the hollow conductor is wound in a helix" (i.e. a spiral) "to form the general shape of a cylinder." The same reasons for rejection, that apply to **claim 1** also apply to **claim 2** and need not be reiterated.

Claim Rejections - 35 USC § 103

35. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

36. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

37. **Claims 3-7,** and **16-19** are rejected under **35 U.S.C. 103(a)** as being unpatentable over **Heid** US patent application publication 2001/0033168 A1 published October 15th 2001, filed April 23rd 2001.

38. **Claims 8-14** are rejected under **35 U.S.C. 103(a)** as being unpatentable over **Heid** US patent application publication 2001/0033168 A1 published October 15th 2001, filed April 23rd 2001; in further view of **Damadian et al.**, US patent 6,369,571 issued April 9th 2002, filed May 10th 2001.

39. With respect to **Claim 8 Heid 2001/0033168 A1** teaches and shows "An" NMR / MRI tomography "apparatus comprising: "a magnetic resonance" tomography "imaging system" [See fig. 1 page 1 paragraph [0001] through paragraph [0008] page 2 paragraphs [0017] through [0027]] "having a plurality of gradient coils positioned about a bore of a magnet to impress a polarizing magnetic field" [See fig. 1 page 1 paragraph [0001] through paragraph [0008] page 2 paragraphs [0017] through [0027]] **Heid 2001/0033168 A1** also teaches and shows a gradient coil is wound of a hollow conductor element such that fluid is permitted to flow through the conductor." [See page 2 paragraphs [0017] through [0027] in these teachings water, oil or a liquid coolant medium flows through the wound hollow tubular, cylindrical, or pipe shaped conduit(s)," (i.e. components 11a, and 11b of figures 2 and 3, which may be formed from electrically conductive copper or aluminum.) [See page 2 paragraph [0017]]. The examiner notes that tubes, pipes and conduits are necessarily and intrinsically hollow and subsequently automatically permit an internal coolant to flow.

40. **Heid 2001/0033168 A1** lacks directly teaching or showing that "an RF transceiver system and an RF switch controlled by a pulse mode to transmit RF signals to an RF coil assembly to acquire MR images;" and "an input device to select a scan sequence"; However, **Damadian et al.**, teaches and shows "An MRI apparatus comprising: a magnetic resonance imaging system (MRI)" [See figure 2] "having a plurality of gradient coils positioned about a bore of a magnet to impress a polarizing magnetic field" [See components 45 in figure 2; figures 17A through 17E col. 8 lines 47-56] "and an RF transceiver system and an RF switch controlled by a pulse mode to transmit RF signals to an RF coil assembly to acquire MR images;" [See col. 10 lines

15-30] "an input device to select a scan sequence";(i.e. the computer control) [See col. 10 lines 15-30]

41. It would have been obvious to one of ordinary skill in the art at the time that the invention was made that the gradient assembly of **Heid 2001/0033168 A1** which shows a cylindrical gradient coil assembly in figure 1, which could be utilized as the cylindrical gradient coil assembly component 45 of / within the **Damadian et al.**, MRI system shown in figure 2, because the **Heid 2001/0033168 A1** invention is directed toward the gradient assembly itself, that is used in combination with conventional MRI / NMR components. The gradient assembly shown by **Damadian et al.**, in figure 2 via component 45 is a series of two sets of cylindrical gradient coils upper and lower, which are arranged in a plane above and below the patient shown in **Damadian et al.**, in figure 2. The ability to modify and combine the **Damadian et al.**, reference with the cylindrical gradient coil assembly of **Heid 2001/0033168 A1** which is shown in **Heid 2001/0033168 A1** figure 1 as a series of two sets of cylindrical gradient coils, upper and lower, also arranged in a plane above and below the patient, which is identified as component 1 of **Heid 2001/0033168 A1;** by switching gradient assembly component 45 of **Damadian et al.**, with the gradient coil assembly of **Heid 2001/0033168 A1** would have been readily obvious to one of ordinary skill in the art at the time that the invention was made when the cooling of the gradient coils is a main concern, because the gradient coil assembly of **Heid 2001/0033168 A1** addresses the functional purpose of maintaining a more efficient consistent cooling of the gradient coil assembly.

42. With respect to **Claim 9**, **Heid 2001/0033168 A1;** shows from the cross section of figure 3 that "the hollow conductor is wound to comprise a transverse coil" because the gradient coil assembly of **Heid 2001/0033168 A1;** includes gradient coils which are both transverse, and parallel to the direction of the main static magnetic field. The same reasons for rejection, that apply to **claim 8** also apply to **claim 9** and need not be reiterated.

43. With respect to **Claim 3**, and **corresponding claims 10** and **16** which depend respectively from **claims 1, 8,** and **15**; **Heid 2001/0033168 A1;** lacks directly teaching that "the hollow conductor is wound for use in a shielded coil" directly. However, **Heid**

2001/0033168 A1; teaches that the gradient coil assembly includes 'a means 14 for reducing non-homogeneity' (i.e. this is a direct teaching of the presence of a shielding means) of the basic magnetic field, for example a passive shim device. [See page 2 paragraph [0024] and figure 2.] Therefore it would have been obvious to one of ordinary skill in the art at the time that the invention was made that the wound hollow conductor windings which comprise the **Heid 2001/0033168 A1;** coil system [See figures 1-3] provide, or are used as, a shielded coil system. [See the abstract, page 1 paragraph [00001] through page 2 paragraph [0027]. The same reasons for rejection, that apply to **claims 1, 2, 8, 9,** and **15** also apply to **claim 3** and need not be reiterated.

44. With respect to **Claim 4**, and **corresponding claims 11** and **17** which depend respectively from **claims 1, 8,** and **15**; **Heid 2001/0033168 A1;** teaches and shows "the gradient coil is comprised of a plurality of hollow conductor sections, each permitting fluid to flow through the conductor." [See Figures 2-3;; page 1 paragraph [00009] through page 2 paragraph [0027].] The same reasons for rejection, that apply to **claims 1, 2, 3, 8, 10, 15 ,16** and the reasons for obviousness, that apply to **claims 3, 10**, and **16** also apply to **claims 4, 11,** and **17** and need not be reiterated.

45. With respect to **Claim 5**, and **corresponding claim 12** which depend respectively from **claims 1,** and **8**; **Heid 2001/0033168 A1;** lacks directly teaching but does suggest from figure 1, (i.e. because figure 1 by itself as illustrated, can be interpreted as a general MRI system which is either of an open or closed architecture.) that "the hollow conductor(s) of figures 2 and 3 are also suggestively wound for use in a flat gradient coil, [See **Heid 2001/0033168 A1;** figure 1, because figure 1 by itself as illustrated, can be interpreted as a general MRI system which is either of an open or closed architecture, and the gradient coil array of figure 1 is suggestively flat. Additionally, It would have been obvious to one of ordinary skill in the art at the time that the invention was made that the similarity of **Heid 2001/0033168 A1;** figure 1, to **Damadian et al**., figures 2, 23, 14, 11, 7, 6, or four when the views are either extended into three-dimensions, or drawn to correspond in two dimensions suggests that "the hollow conductor(s) are capable of being wound for use in a flat gradient coil. The examiner also notes that the side view of figure 3 of **Heid 2001/0033168 A1;** also

suggests both a flat and a rounded gradient coil assembly, which may be combined together. Therefore, It would have been obvious to one of ordinary skill in the art at the time that the invention was made that the gradient coil assembly of **Heid 2001/0033168 A1;** can also be suggestively modified based on figure 3 for use in a flat "open architecture Magnetic Resonance Imaging device", such as **Damadian et al.**, because in open architecture MRI devices the gradient coils are traditionally flat / planar / pancaked on opposite sides of a patient examination zone, without enclosing the patient in order to give the patient a sense of "openness" and to diminish any claustrophobic fears of a patient. Therefore the implementation of the **Heid 2001/0033168 A1;** gradient coil system also a flat gradient coil assembly would also have been a readily obvious modification, of the disclosed **Heid 2001/0033168 A1;** gradient coil system to one of ordinary skill in the art at the time the invention was made, The same reasons for rejection, that apply to **claims 1, 2, 3, 4, 8, 10, 11, 15 ,16, 17** and the reasons for obviousness, that apply to **claims 3, 10**, and **16** also apply to **claims 5,** and **12** and need not be reiterated.

46. With respect to **Claim 6**, and **corresponding claims 13** and **18** which depend respectively from **claims 1, 8,** and **15**; **Heid 2001/0033168 A1;** teaches and suggests that additional cooling is provided by a plurality of coolant pipes situated in thermal contact around the coil" windings. [See figures 2 and 3 which show inner and outer cooling pipe-conduits 11a, 11b, and page 2 paragraph [0025]] . The same reasons for rejection, that apply to **claims 1, 2, 3, 4, 5, 8, 10, 11, 12, 15 ,16, 17** and the reasons for obviousness, that apply to **claims 3, 10**, and **16** also apply to **claims 6, 13,** and **18** and need not be reiterated.

47. With respect to **Claim 7**, and **corresponding claims 14** and **19**, which depend respectively from **claims 1, 8,** and **15**; **Heid 2001/0033168 A1;** teaches that "the coolant passed through the tubular area is water, ethylene glycol or a mixture of the two coolants." [See page 2 paragraph [0023]. The examiner notes that the teaching of using water or a 'coolant medium' directly meets all the recited features of this claim because a "coolant medium" comprises within its scope the use of "water, ethylene glycol or a mixture of the two coolants" as the coolant.] The same reasons for rejection, that apply

to **claims 1, 2, 3, 4, 5, 6, 8, 10, 11, 12, 13, 15 ,16, 17, 18** and the reasons for obviousness, that apply to **claims 3, 10**, and **16** also apply to **claims 7, 14,** and **19** and need not be reiterated.

Prior art of Record

48. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The Asterisk denotes art noted as per this office action.

A) ***Doty et al.,** US patent 5,554,929 issued September 10th 1996, filed March 12th 199. which is the corresponding parent case of which **Doty et al.,** US patent 5,886,548 issued March 23rd 1999 is a divisional.

B) **Heid** US patent application publication 2003/0218460 A1 published November 27th 2003, with an effective US filing date of April 11th 2003.

C) **Vavrek et al.,** US patent 5,304,933 issued April 19th 1994.

D) **Damadian et al.,** US patent 6,445,186 B1 issued September 3rd 2002; filed May 10th 2001.

E) **Damadian et al.,** US patent 6,469,508 B1 issued October 22nd 2002; filed May 10th 2001.

F) **Damadian et al.,** US patent 6,496,007 B1 issued December 17th 2002; filed May 10th 2001.

G) **Damadian et al.,** US patent 6,335,623 B1 issued January 1st 2002; filed November 25th 1998.

H) **Wollin** US patent 6,452,390 B1 issued September 17th 2002, filed November 15th 2000.

I) **Herd et al.,** US patent 5,774,032 issued June 30th 1998.

J) **Lew** US patent 4,901,018 issued February 13th 1990.

K) **Marshall** US patent 3,412,320 issued November 19th 1968.

L) ***Arz et al.,** US patent 6,741,152 B1 issued May 25th 2004, filed September 2nd 1999. [See entire reference]

M) ***Arz et al.,** DE patent 198 39 987 A1 published March 9th 2000 which corresponds to ***Arz et al.,** US patent 6,741,152 B1 issued May 25th 2004, filed September 2nd 1999.

N) **Boemmel et al.**, US patent 6,111,412 issued August 29th 2000, filed May 22nd 1998

O) ***Heid** US patent application publication 2001/0033168 A1 published October 25th 2001, with an effective US filing date of April 23rd 2001. [See figures 2 and 3; paragraphs [0002] through [0027]]

P) ***Morich et al.**, US patent 5,424,643 issued June 13th 1995.

Q) **Mantone et al.,** US patent application publication 2005/0035764 A1 published Feb. 17th 2005, filed August 14th 2003, which is the corresponding application of applicant's instant application which is noted fort the purposes of a complete record only, and is not available as prior art against the claims of the instant invention.

R) **Doty et al.**, US patent 5,886,548 issued March 23rd 1999, filed February 29th 1996.

Conclusion

49. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tiffany Fetzner whose telephone number is: (571) 272-2241. The examiner can normally be reached on Monday-Thursday from 7:00am to 4:30pm., and on alternate Friday's from 7:00am to 3:30pm.

50. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez, can be reached at (571) 272-2245. The **only official fax phone number** for the organization where this application or proceeding is assigned is **(703) 872-9306**.

TAF
August 6, 2005

Diego Gutierrez
Supervisory Patent Examiner
Technology Center 2800